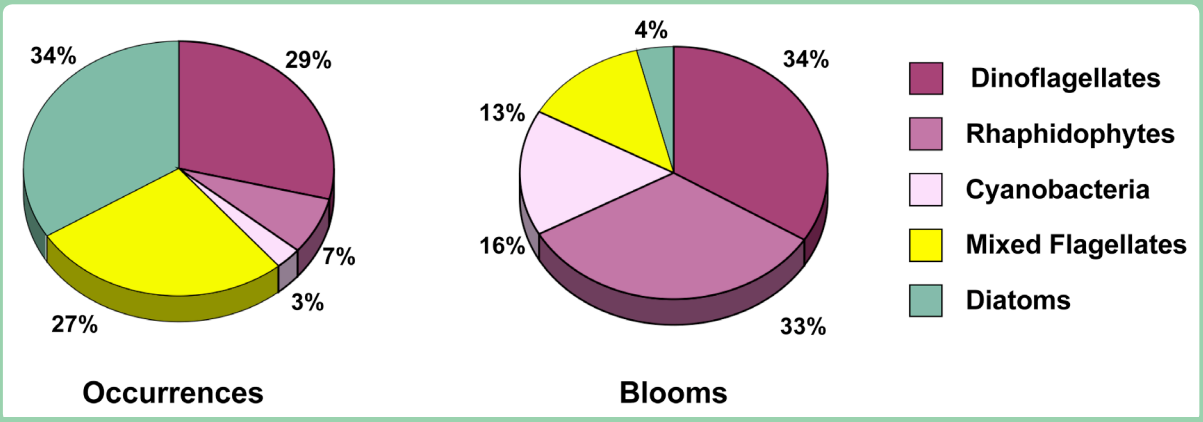
Box 3.4.1 Harmful Algae and Coastal Stormwater Ponds

In coastal stormwater ponds, the algal assemblage is dominated by harmful species that frequently produce blooms (> 1000 cell/ml). The algae producing these blooms are most frequently classified as dinoflagellates, raphidophytes, and cyanobacteria, which all have potentially toxic species. In the rapidly urbanizing South Carolina coastal zone, intensive landscape maintenance and turf management are significant sources of non-point source pollutant and nutrient loadings (Lewitus, *et al*., 2003). The stormwater best management practice of choice in this region is wet detention ponds. Typically, stormwater is piped directly into the ponds, but their capacity for processing pollutants is limited. These highly eutrophic ponds are "hot spots" for harmful algal blooms, many associated with measured toxins, fish kills, or shellfish health effects. Pond nutrient accumulations may also impact estuarine eutrophication through surface or groundwater transport (Pinckney *et al*., 2001). The pie charts below show the percent occurrence (by group) of all species and percent blooms (by group) of all blooms (>1000 cells/ml) between 2000 and 2005. During this period 325 blooms were recorded in brackish detention ponds and 25 in South Carolina's estuarine and coastal environment. Note that most of the blooms are attributed to dinoflagellates, raphidophytes and cyanobacteria.



The percent occurrence and percent of blooms of harmful species in eutrophic coastal locations (detention ponds and nearby impaired estuaries) from the larger South Carolina Harmful Algal Bloom database between 2000 and 2005.

taxa do, however, respond rapidly to increased nutrient levels and will dominate the biomass in enriched brackish environments (Ramus *et al.,* 2003). Unfortunately, there are far too many examples of these enriched brackish environments in South Carolina coastal zone. Stormwater ponds along the coast serve as incubators for harmful algal blooms and appear to be acting as a source of these harmful species into the adjacent estuaries (Box 3.4.1).

In contrast to this scenario of eutrophic water which reflects the anthropogenic effects of development, the majority of sites investigated in the 2003-2004 SCECAP program appeared to be in good condition and supported a diverse and desirable phytoplankton assemblage. The CHEMTAX evaluation of the percent biomass contribution by taxa demonstrated that 86-88% of the biomass was "healthy" (diatoms or mixed flagellates) and 13-14% was potentially harmful (dinoflagellates, raphidophytes or cyanobacteria). Diatoms are common in pristine estuaries and contribute efficiently to the food web (Lewitus *et al*., 1998). They contributed 48% of the biomass in the open water habitats and 41% of the biomass in the tidal creek habitats. Mixed flagellates were also dominant, and, while not as effective in transferring carbon and energy through the aquatic food web as the diatoms, they are considered desirable phytoplankton. The average relative biomass contributed by mixed flagellates was 39% in open water and 45% in tidal creek habitats (Figure 3.4.1). The smallest fraction of the biomass